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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/032,563	01/02/2002	Masahiro Ishida	740819-723	5817
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NIXON PEABODY, LLP 8180 GREENSBORO DRIVE SUITE 800 MCLEAN, VA 22102				
EXAMINER MALDONADO, JULIO J				
ART UNIT		PAPER NUMBER		
2823				

DATE MAILED: 10/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/032,563

Applicant(s)

ISHIDA, MASAHIRO

Examiner

Julio J. Maldonado

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 July 2003.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3 and 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (U.S. 6,113,685) in view of Asai et al. (U.S. 6,426,519 B1).

In reference to claim 1, Wang et al. (Fig.1) in a related method to form a nitride layer teach a first step of providing an upper portion of a base substrate (12); a second step of growing a semiconductor layer of nitride (10) on said upper portion of said base substrate (12), wherein said upper surface of said semiconductor layer (10) is thereof even; and a third step of irradiating an interface between said semiconductor layer (10) and said base substrate (12) with a laser beam (14), thereby separating said semiconductor from said base substrate (12) to form a semiconductor substrate from said semiconductor layer (10) (column 2, line 20 – column 3, line 25). Wang et al. also teach wherein in said third step, the laser beam (14) is irradiated upon said semiconductor layer (10) from the surface opposite to the upper portion of said base substrate (12) and upon at least a portion in said base substrate while scanning along portions surrounded by a region (13) on said base substrate (12), while stress is being generated at the interface between the base substrate (12) and the semiconductor layer (10) (column 3, lines 3 –25).

Wang et al. fail to teach a first step of selectively forming a raised and recessed region in an upper portion of a base substrate with a plurality of grooves extending parallel to each other, wherein the area occupied by the recessed portions is about in the range from about 1/5 to about 100 times the area occupied by the raised portions. However, Asai et al. (Figs.3-5) in a related method to form a nitride layer teach a first step of selectively forming a raised and recessed region in an upper portion of a base substrate (21) with a plurality of grooves (24) extending parallel to each other, wherein the area occupied by the recessed portions is about the same as the area occupied by the raised portions; and growing a nitride layer (26) over the upper portion of the base substrate (21), wherein forming the raised and recessed regions would result in a nitride layer (26) with reduced dislocations (column 4, line 5 – column 5, line 32). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Asai et al. and Wang et al. to enable the upper surface having raised and recessed portions as taught by Asai et al. to be formed in the semiconductor forming process of Wang et al. It would also have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Wang et al. and Asai et al. to enable irradiating at least a raised portion surrounded by a groove in the substrate as taught by Asai et al. with the laser beam as taught by Wang et al.

3. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. ('685) in view of Asai et al. ('519 B1) as applied to claims 1-3 and 5-8 above, and further in view of Sunakawa et al. (U.S. 6,348,096 B1).

The combined teachings of Wang et al. and Asai et al. substantially teach all aspects of the invention including providing a base substrate comprising sapphire but fail to teach wherein the base substrate comprises sapphire whose main surface is in the {0001} plane orientation, and the direction of the zone axis of each said groove is in the {1-100} direction in said base substrate. However, Sunakawa et al. (Fig.1) in a related method to form a nitride layer teach providing a base substrate (11) comprising sapphire whose main surface is in the {0001} plane orientation, and the direction of the zone axis of a plurality of grooves (13) in the {1-100} direction in said base substrate (11) (column 3, line 9 – column 5, line 45). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the sapphire base substrate and the grooves in the plane direction as taught by Sunakawa et al. in the nitride layer formation method as taught by Wang et al. and Asai et al., since this would improve the flatness of the nitride layer (column 5, lines 38 – 45).

Response to Arguments

4. Applicant's arguments filed 07/17/2003 have been fully considered but they are not persuasive.

Applicants argue, "...according to Wang, the GaN layer 10 is selectively grown in the sapphire substrate 12 with the mask film 11, which is composed of a material in which GaN is not grown, interposed therebetween... Wang is different from the present invention...". In response to this argument, contrary to applicants' assertion, there is no description in Wang et al. that the GaN is not grown on the mask film 11. Wang et al.

teach that the layer of material 11 at the interface between the substrate 12 and the GaN layer 10 is where a laser beam is irradiated (Wang et al., column 2, lines 40 – 44).

Also, applicants argue, "...according to Wang...the GaN is not epitaxially grown...". In response to this argument, Wang et al. do teach the GaN is epitaxially grown (column 2, lines 20 – 24).

Furthermore, applicants argue, "...Asai merely teaches...growing a nitride semiconductor 26 on a sapphire substrate 21, in which top portion a plurality of strip-shaped ditches are provided, but fails to disclose about separating the nitride semiconductor 26 from the sapphire substrate...Asai also fails to disclose that once a nitride semiconductor layer is epitaxially grown on a raised and recessed region provided in a base substrate, while stress is being generated at the interface between the nitride semiconductor layer and the base region...". In response to this argument, Asai et al. wasn't relied upon that teaching. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within


TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

6. Papers related to this application may be submitted directly to Art Unit 2823 by facsimile transmission. Papers should be faxed to Art Unit 2823 via the Art Unit 2823 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2823 Fax Center number is **(703) 305-3432**. The Art Unit 2823 Fax Center is to be used only for papers related to Art Unit 2823 applications.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Julio J. Maldonado** at **(703) 306-0098** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via julio.maldonado@uspto.gov. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (703) 306-2794.

Any inquiry of a general nature or relating to the status of this application should be directed to the **Group 2800 Receptionist** at **(703) 308-0956**.


JMR
10/1/03


George Fourson
Primary Examiner